Alabama Space Grant Consortium
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Consortium URL: www.uah.edu/ASGC/
Grant Number: NNX10AJ80H

## PROGRAM DESCRIPTION

The National Space Grant College and Fellowship Program consists of 52 state-based, university-led Space Grant Consortia in each of the 50 states plus the District of Columbia and the Commonwealth of Puerto Rico. Annually, each consortium receives funds to develop and implement student fellowships and scholarships programs; interdisciplinary space-related research infrastructure, education, and public service programs; and cooperative initiatives with industry, research laboratories, and state, local, and other governments. Space Grant operates at the intersection of NASA's interest as implemented by alignment with the Mission Directorates and the state's interests. Although it is primarily a higher education program, Space Grant programs encompass the entire length of the education pipeline, including elementary/secondary and informal education. The Alabama Space Grant Consortium is a Designated Consortium funded at a level of $575,000 for fiscal year 2011.

## PROGRAM GOALS

The Strategic Plan and Goals of the ASGC contains the following Vision and Mission Statements. Our specific goals are aligned with the ASGC strategic plan, with NASA's Education Enterprise Strategy and Human Capital Management Plans, and with the recommendation of the President's Commission on Implementation of U.S. Space Exploration.

Our Mission is: to inspire, enable and educate a diverse group of Alabama students to take up careers in space science, aerospace technology and allied fields; to play our part in assuring U.S. leadership in space exploration and aerospace technology in the future; to inspire the next generation of space explorers; to bring increased realization of the value of space science and technology to the people of Alabama; to insure that our message and our programs reach all constituencies in the population of Alabama, especially those traditionally under-represented in the science and engineering professions.

Our Vision is: an increased level of appreciation, participation and leadership by all the people of Alabama in the national and international space exploration and aerospace engineering enterprises. The ASGC program has, over the years, selected components in each of the NASA Space Grant national emphasis areas that also fit well with Alabama interests in one, and usually both, of the following senses: 1) there is a clear existing need and interest shown by an Alabama faculty member, a teacher, a group of students, school

system, university, industry, museum, etc.; and 2) there is evident willingness of an Alabama stakeholder to provide matching resources to achieve common objectives with NASA (the ASGC program shows match, or co-funding, mostly from non-federal sources of a ratio of 1:1 for every NASA dollar).

**Outcome 1 (Employ and Educate) Consortium Fellowship/Scholarship, Research Infrastructure, and Higher Education Program Goals and SMART Objectives.**
*Contribute to the development of the STEM workforce in disciplines needed to achieve NASA's strategic goals, through a portfolio of investments.*

**ASGC Program Goals: Fellowship & Scholarship**

1) Support and maintain our fellowship and scholarship program with high-caliber students;
2) Recruit fellows and scholars at all 7 member PhD-granting institutions;
3) Each fellowship will be matched by another of equal value using local funds; and
4) Actively recruit and support students in STEM fields from traditionally underrepresented groups at a rate consistent with NCES for Alabama.

**SMART Objectives: Fellowship & Scholarship**

- Objective 1: All 7 member PhD-granting institutions will have recruited a minimum of 3 fellows/scholars per university in FY11.
- Objective 2: In FY11, each affiliate will continue to match each fellowship it receives with a second fellowship to be administered by ASGC at the same value and will maintain the $37,000 stipend level to remain competitive with other Federal agencies. (This brings an additional $222K of non-Federal funds into the ASGC fellowship program).
- Objective 3: All recruited fellow and scholar awardees in FY11 will have a diversity level of 25% minority and 40% female participants.

**ASGC Program Goals: Research Infrastructure Development**

1) Support a significant number of motivated students and mentors encompassing a wide range of experiences in internships at NASA centers and collaborating industry;
2) Recruit a diverse cadre of students to work on mentored research projects at our established REU Programs at Alabama universities;
3) Ensure all REU projects funded with NASA funds shall be aerospace science and technology or STEM focused;
4) Support underrepresented faculty or faculty from our MSI members at research opportunities at NASA field centers; and
5) Actively recruit and support students and faculty in STEM fields from traditionally underrepresented groups at a rate consistent with NCES for Alabama.

**SMART Objectives: Research Infrastructure Development**

- Objective 1: A diverse group of 8 students from Alabama Universities will be placed as interns at NASA centers and collaborating industry in FY11.
- Objective 2: A diverse group of 24 students will be recruited to work on mentored research projects at 3-4 Alabama universities via our Research Experience for Undergraduates Programs in FY11.

- Objective 3: 1 underrepresented faculty or 1 faculty from our MSI members will be placed at a research opportunity at a NASA field center in FY11.
- Objective 4: All recruited research infrastructure participants in FY11 will be 25% minority and 40% female.

**ASGC Program Goals: Higher Education**

1) Support special courses in Space Hardware Building and Project Management;
2) Maintain and grow student ***Building Space Hardware*** programs throughout the State of Alabama; and
3) Actively recruit and support students and faculty in STEM fields from traditionally under-represented groups at a rate consistent with NCES for Alabama.

**SMART Objectives: Higher Education**

- Objective 1: 3 special courses in Space Hardware Building and Project-Management will be supported at 3 of Alabama universities in FY11.
- Objective 2: Maintain 15 student building space hardware programs at 6 universities in FY11, including 4 programs at 2 HBCU's.
- Objective 3: Initiate 1 new student building space hardware program at 1 university or 1 community college in FY11.
- Objective 3: All recruited higher education participants in FY11 will be 25% minority and 40% female.

**Outcome 2 (Educate and Engage): Consortium Pre-college Programs Goals and SMART Objectives.**

*Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers and faculty.*

**ASGC Program Goals: Pre-college Education**

1) Support a select set of projects and events that emphasize the development of K-12 teachers, particularly in pre-service and in-service program areas, which encourage young students to prepare for STEM careers;
2) Leverage funds with larger contributions from other sources;
3) Focus on in-service and/or pre-service teacher training that results in deeper content understanding and/or competence and confidence in teaching STEM disciplines;
4) Support NASA Education programs;
5) Evaluate programs to insure continuous improvement; and
6) Direct programs to underrepresented and underserved populations.

**SMART Objectives: Pre-college Education**

- Objective 1: 3 in-service and/or pre-service teacher educators will attend teacher educator workshops in FY11.
- Objective 2: Undefined. Targets of opportunity that meet the program goals will be identified and pursued.

**Outcome 3 (Engage and Inspire): Consortium General Public and External Relations Program Goals and SMART Objectives.**

*Build strategic partnerships and linkages with STEM formal and informal education*

*provides that promote STEM literacy and awareness of NASA's mission.*

**ASGC Program Goals: General Public and External Relations**
1). Actively engage members of the public from traditionally underrepresented groups;
2) Bridge the gap between Land and Earth Grant research and geospatial technology and societal needs in Alabama;
3) Leverage funding to extend the reach of SG beyond direct investment;
4) Support science education needs in underserved schools;
5) Engage students in informal education initiatives; and
6) Track impacts and evaluate programs success via quantitative and qualitative methods to insure continuous process improvement.

**SMART Objectives: General Public and External Relations**

- Objective 2: 1 training workshop on satellite remote sensing and Geographic Information Systems (GIS) technology will be offered in FY11 by 1 Alabama University.
- Objective 3: In FY11, 2 state Regional Science Olympiad and Science Fairs that are supported by the ASGC and held annually at the lead-institution will have over 1,500 participants.

## PROGRAM/PROJECT BENEFIT TO OUTCOME (1,2, OR 3)

We provide some anecdotal examples of how we are contributing to the 3 outcomes. All comments come from students who were supported by the ASGC in FY11.

***NASA Education Outcome 1:***

The space grant scholarship I received has helped me tremendously. My current job as a Research Assistant at the University of Alabama is a direct result of my participation in the Space Grant program. I met my current mentor during the fellowship/scholarship awards ceremony at NASA MSFC that the Space Grant Consortium hosted for us. I also believe that having the ASGC scholarship listed on my resume helped me get into the NASA Propulsion Academy, which was undeniably the experience of a lifetime. (Daniel Jones – on 1/3/12, 2010 Space Grant Scholar, 2011 NASA Propulsion Academy, MSFC, University of Alabama, Research Assistant, University of Alabama).

Through the Space Grant program, I received the financial aid I needed that would allow me to focus my time and energy on my studies and bettering myself as a teacher in order to give my students the best education possible without the added stress of working part time during my college career. The program has also influenced me to structure my teaching in a way that emphasizes how mathematics is incorporated into our everyday life, and into the Space Program. Being from Huntsville, AL and hoping to teach in Huntsville, many of my classmates and future students will have strong ties to NASA. Being able to relate my lessons to something they all can understand will help them understand the material. (Ann Marie Thomas - on 01/17/12, 2010 Space Grant Scholar, MTLC - Math Tutor).

The Research Experiences for Undergraduates (REU) program provided me an opportunity to start working on a cold storage project for the International Space Station through a contract with NASA. I hope to expand into other aerospace-related fields from within the Center for Biophysical Sciences and Engineering at the University of Alabama at Birmingham. (David Cooper – on 4/10/11, 2010 Research Experiences for Undergraduates, and 2010 Space Grant Scholar, University of Alabama at Birmingham – Mechanical Engineer).

***NASA Education Outcome 2:***

I am always looking for quality teacher professional development opportunities that will be fruitful in providing new teaching methods, teacher collaboration/planning and alternative ideas and methods. It was definitely worthwhile and beneficial for me to attend the Space Exploration Educators Conference at JSC because now I feel I have returned to classroom with the latest knowledge and tools on space exploration education. In November of 2011, I was able to take a group of my High School students to see the Mars Science Laboratory Launch at KSC. As a result, I have a renewed enthusiasm for teaching! (Doreen Forsythe – on 3/19/12, Lee High School, Huntsville, AL, Engineering Teacher).

With all of the reports stating that America's students are declining in the fields of science and mathematics, teacher professional development opportunities need to be accessible and valuable. Teachers, as well as students, need to do their part in order to improve and make gains in STEM subjects. I appreciate the Alabama Space Grant Consortium for providing me and other educators with opportunities to expand and build on our existing knowledge. By attending the Alabama Science Teachers Association Conference at the McWane Science Center in Birmingham, I was able to learn new ideas, provide suggestions and increase community and collaboration between other teachers. It allowed me to also stay up-to-date on the trends and issues in science that concern my school. (Michelle Cleveland – on 10/28/12, Liberty Middle School, Madison, AL, Honors Biology Teacher).

***NASA Education Outcome 3:***

Being the school, county, and state science fair coordinator and robotics team sponsor, has allowed me to participate in various STEM and outreach activities over the years. I feel the students get so much out of participating in Science and Engineering Fairs in particular because it is such a rewarding experience on many levels – it not only helps build character, but it also provides students with opportunities to travel to new places and meet other students from all over the world. It also promotes enthusiasm for science and engineering, helps improve speaking and writing abilities, exposes students to new innovations and ideas in the scientific and engineering worlds. Thanks to the Alabama Space Grant Consortium for its continued support of the Alabama Science and Engineering Fair within the State. My students that participate gain so much knowledge and it assists them with their future educational and occupational goals. (Virginia A. Vilardi – on 3/7/12. Wetumpka High School, Wetumpka, AL, Physics, AP Biology, Chemistry, Science Research and Inquiry Teacher).

My experience with the Science Olympiad has given me more purpose to my classroom. I feel strongly about the goal of finding a way to combine education and scientific learning with competition. Also because of my involvement with the Science Olympiad, I was able to get a promotion within my department and being from a school that mainly focuses on Fine Arts, it is especially important for me to get the Mathematics and Science component into the classroom. (Ms. Tessa Magnuson – on 2/17/2012. Math and Science Teacher, Alabama School of Fine Arts, Birmingham, AL, Mathematics and Science Teacher).

***Consortium Highlights:***

ASGC launched its first student-built satellite in FY11. The ASGC-sponsored Auburn University Student Space Program (AUSSP) launched "AubieSat-1" with five other university CubeSats selected for launch on October 28, 2011 aboard a Delta II rocket from Vandenberg AFB in California. "AubieSat-1" was designed to study radio wave propagation through the ionosphere and test solar panel protective films. The AUSSP is advised by Dr. J-M Wersinger, Physics Dept., and Dr. David Beale, Mechanical Engineering Dept.

The University of Alabama in Huntsville won first place in the 19th annual NASA Great Moonbuggy Race at the U.S. Space & Rocket Center in Huntsville, Alabama on April 13-14, 2012. UAH also received the best report award for technical documentation. This team is advised by Dr. Christina Carmen, Mechanical and Aerospace Engineering Dept.

The University of Alabama in Huntsville's Space Hardware Club placed fourth in the International CanSat Competition in Cross Plains, TX. This competition is sponsored by AIAA, NASA GSFC and the Naval Research Lab. The objective of the CanSat Competition is to conceive, design, build, test, and fly a small two unit mock satellite to an altitude of 91 meters. The Carrier and the Lander then separate with the Lander returning an egg safely to the ground.

The University of Alabama's Lunabotics Team won first place in the "Team Spirit" category during the NASA's 2nd Annual Lunabotics Mining Competition held at KSC on May 23-28, 2011. Their faculty advisor is Dr. Kenneth Ricks, Mechanical Engineering Dept. The Lunabotics challenge is for students to design and build an excavator, called a Lunabot, that can mine and deposit lunar simulant.

The University of Alabama in Huntsville's team won first place and prize money of $3,500 during the NASA's Wormbot Competition in May, 2011. This was a NASA ESMD Systems Engineering Paper Competition.

## PROGRAM ACCOMPLISHMENTS

***NASA Education Outcome 1:***

**ASGC Program Goals: Fellowship & Scholarship**

1) Support and maintain fellowship and scholarship program with high-caliber students;
2) Recruit fellows and scholars at all 7 member PhD-granting institutions;
3) Each fellowship will be matched by another of equal value using local funds; and
4) Actively recruit and support students in STEM fields from traditionally underrepresented groups at a rate consistent with NCES for Alabama.

**SMART Objectives: Fellowship & Scholarship Accomplishments**

- Objective 1: *All 7 member PhD-granting institutions recruited and awarded fellows and scholars in FY11 (AAMU, 11 students, AU, 4 students, UA, 9 students, UAB, 3 students, UAH, 8 students, USA, 7 students & TU, 1 student). A total of 43 fellowships and scholarships were awarded and directly funded in FY11 (10 Graduate Fellows, 31 Undergraduate Scholars and 2 Teacher Educator Scholars). The total amount of NASA funds awarded to Fellows and Scholars by ASGC in FY11 was $215K. This was matched with $185K in state funds for a total of $400K (**Note: these numbers are for base funds only. We plan to award additional fellowship/ scholarship awards with our augmentation funds).*
- Objective 2: Each member matched each fellowship it received in FY11 with a second fellowship at the same value ($37K). This brought an additional $185K of non-Federal funds into the ASGC Fellowship program.
- Objective 3: The ASGC exceeded its recruiting objectives for fellow and scholar awardees in FY11. We had projected a diversity goal of 25% underrepresented minority (actual was 40%) and 40% female participants (actual was 42%) in these programs. We had 77% undergraduate and 23% graduate awardees.

  76 total students were "significantly supported" from FY11 funds (43 fellowship/scholarship and 33 higher education/research infrastructure). During the FY11 program year 15 are pursuing advanced degrees in STEM disciplines, 3 accepted STEM positions at NASA contractors, 45 accepted STEM positions in industry, 1 accepted a position at NASA, 1 accepted a STEM position in K-12 academia, 4 accepted STEM positions in academia, and 7 went on to positions in non-STEM disciplines. The remaining students have not yet received the degree they were pursuing while they received their Space Grant award.

**ASGC Program Goals: Research Infrastructure Development**

1) Support a significant number of motivated students and mentors encompassing a wide range of experiences in internships at NASA centers and collaborating industry;
2) Recruit a diverse cadre of students to work on mentored research projects at our established REU Programs at Alabama universities;
3) Ensure all REU projects funded with NASA funds shall be aerospace science and technology or STEM focused;
4) Support underrepresented faculty or faculty from our MSI members at research opportunities at NASA field centers; and
5) Actively recruit and support students and faculty in STEM fields from traditionally underrepresented groups at a rate consistent with NCES for Alabama.

**SMART Objectives: Research Infrastructure Development Accomplishments**

- Objective 1: ASGC directly funded 5 student interns in FY11. A diverse group of 5 students from Alabama Universities were placed in research internships at NASA

centers (Ames, KSC, MSFC & Stennis) in FY11 that were directly funded by the ASGC. With our augmentation funds, we plan to hit our target objective of funding a total of 8 student interns in FY11.

- Objective 2: ASGC surpassed its objective of directly funding 24 REU students in FY11 by 2. A diverse group of 26 direct funded students were recruited to work on mentored research projects at 2 Alabama universities (UAH & USA) via our Research Experience for Undergraduates Programs in FY11. We directly funded 33 total students in Research Infrastructure overall with 45% female participants, 55% male participants. We had 91% undergraduate and 9% graduate participants. With our augmentation funds, we plan to fund another REU program at 1 university.
- Objective 3: Although we assisted MSFC in running their Summer Faculty Fellowship Program in FY11, we were not able to direct support any faculty members at a NASA field center. Our objective was to support 1 underrepresented faculty or 1 faculty from our MSI members, but we did not accomplish this in FY11.
- Objective 4: We directly funded 33% underrepresented minorities under Research Infrastructure in FY11. We went over our objective of 25% by 8%). We did accomplish our objective of funding 45% female participants, which is the same as the previous year.

**ASGC Program Goals: Higher Education**

1) Support special courses in Space Hardware Building and Project Management;
2) Maintain and grow Student Building Space Hardware Programs throughout the State of Alabama; and
3) Actively recruit and support students and faculty in STEM fields from traditionally underrepresented groups at a rate consistent with NCES for Alabama.

**SMART Objectives: Higher Education Accomplishments**

- Objective 1: Injection of new courses into the undergraduate curriculum is extremely difficult at U.S. universities. We have done this at 3 universities in the past and it is a testament to the excellence of our faculty instructors. In FY11, we reached our objective and supported 3 special courses in Space Hardware Building and Project Management (1 of these courses is newly developed by a minority, female faculty at UAH, Dr. Christina Carmen) at 1 of our Alabama universities (UAH).
    - UAH – MAE 493/491/492: Dr. Christina Carmen, "New Course Development: Exploration Habitat (X-Hab 2013 Academic Innovation Challenge Design Project",
    - UAH – MAE 490/491/492: Dr. Christina Carmen, "New Course Development: Collaboration between NASA and MAE 490/491/492 Senior Design to Develop a Lunar Wormbot, Phase II.",
    - UAH – MAE 493/593: Dr. Robert Frederick, "Propulsion Engineering & Rocket Design".
- Objective 2: ASGC was able to reach its objective of funding 9 *students building space hardware* programs, or SSP's. We exceeded this objective by actually funding 12 SSP's with its base funding. These SSP's were in the following areas: BalloonSat, CanSat, CubeSat, Design/Build/Fly, Moonbuggy, Lunar Regolith/Lunabotics, Mars Rover, and USLI at 6 universities (AAMU, AU, UA,

UAH, USA, and TU), including 4 programs at 2 HBCU's (Moonbuggy, BalloonSat and USLI at AAMU, and USLI at TU).

- Objective 3: ASGC continued its 1 new student building space hardware program (Moonbuggy) at 1 community college (Bevill State Community College) in FY11. 1 newly initiated program (bridge program with UA to work on USLI and Lunabotics) at 1 community college (Shelton State Community College) will be reported on with our augmentation funds in FY11.
- Objective 3: **Directly funded higher education participants in FY11**. We reached our objectives of a diversity level of 25% (actual 37%) underrepresented minority and 40% (actual 41%) female participants in these programs. All directly funded higher education participants were 98% undergraduates and 5% graduates in FY11. ASGC had a total of 189 higher education direct student participants FY11. With our augmentation funds, we plan to increase the total number of direct student participants.

***NASA Education Outcome 2:***

**ASGC Program Goals: Pre-college Education**

1) Support a select set of projects and events that emphasize the development of K-12 teachers, particularly in pre-service and in-service program areas, which encourage young students to prepare for STEM careers;
2) Leverage funds with larger contributions from other sources;
3) Focus on in-service and/or pre-service teacher training that results in deeper content understanding and/or competence and confidence in teaching STEM disciplines;
4) Support NASA Education programs;
5) Evaluate programs to insure continuous improvement; and
6) Direct programs to underrepresented and underserved populations.

**SMART Objectives: Pre-college Education Accomplishments**

- Objective 1: In FY11, we supported 6 in-service and/or pre-service teacher educators by having them attend teacher educator workshops. Our objective was to support 3 so we doubled the number of teachers supported. We sent 6 teachers to 2 different workshops (1 workshop was a 3-day event at the annual Space Exploration Educators Conference at JSC, Houston, TX and 1 workshop was a 1-day event at the Alabama Science Teachers Association Fall Conference at the McWane Science Center in Birmingham, AL. We also funded 25 STEM teacher educator scholarships so they could attend the 2012 Education Summit and STEM Education Forum held at the University of South Alabama (USA), in Mobile, AL which covered points such as changes and programs needed for postsecondary STEM teacher preparation, the role of business in support of next generation STEM standards and policy and legislative issues related to improving and sustaining STEM initiatives.
- Objective 2*: Learning Opportunities for Middle School students and Educators: We are working with the UAH Institute for Science Education and the Alabama Mathematics, Science, Technology and Engineering Coalition for Education to provide new BalloonSat opportunities for Middle School students and educators. Middle school students will be provided with an exciting introduction to the engineering process in the aerospace world of 'design, build, fly and evaluate.' The

classroom curriculum will track the BalloonSat experience and the intention is to use this project as a pilot for a feeder-system into the established Alabama Engineering Academy Initiative in area high schools. This opportunity will target schools having high minority participation and they hope to see increased SAT scores in physical science. **Note: This objective will be addressed further with our augmentation funds.*

- Objective 3: ASGC supported 1 renewed, 1-week summer program in FY11 which targets High School Students through an outreach program involving Bioengineering and Chemical Engineering. University of South Alabama (USA) provided opportunities for students to interact with scientists and engineers at USA with intentions of getting these students into the STEM pipeline and go onto pursue degrees in STEM fields once they graduate high school.

***NASA Education Outcome 3:***

**ASGC Program Goals: General Public and External Relations**

1). Actively engage members of the public from traditionally underrepresented groups;
2) Bridge the gap between Land and Earth Grant research and geospatial technology and societal needs in Alabama;
3) Leverage funding to extend the reach of SG beyond direct investment;
4) Support science education needs in underserved schools;
5) Engage students in informal education initiatives; and
6) Track impacts and evaluate programs success via quantitative and qualitative methods to insure continuous process improvement.

**SMART Objectives: General Public and External Relations Accomplishments**

- Objective 2: ASGC supported 2 faculty members from AU and AAMU, an HBCU, to attend the 28$^{th}$ annual Louisiana Remote Sensing and GIS workshop in Baton Rouge, LA in FY11. Our objective was to support a remote sensing workshop in AL, but this year we opted to send faculty to a workshop out of state since it was in our region and we had interested faculty in this particular workshop. Members from the U.S. Census Bureau, NOAA and Homeland Security presented at this workshop.
- Objective 3: In FY11, ASGC supported 3 State Regional Science Olympiad and Science Fairs that are held annually at the lead-institution, UAH, and these events hosted over 1,200 indirect participants and are venues to attract students in informal education initiatives and allow us to leverage our funding with co-sponsors. Members of the public from the entire State of Alabama are present at these events.

## PROGRAM CONTRIBUTIONS TO PART MEASURES

- **Student Data and Longitudinal Tracking***:
  Total awards = 76; Fellowship/Scholarship = 43, Higher Education/Research Infrastructure = 33; 28 of the total awards represent underrepresented minority funding. 76 students took their next step in FY11 (SG participation supported from FY06-11 funds). During the FY11 program year 15 are pursuing advanced degrees in STEM disciplines, 3 accepted STEM positions at NASA contractors, 45 accepted STEM positions in industry, 1 accepted a position at NASA, 1 accepted a STEM position in K-12 academia, 4 accepted STEM positions in academia, and 7 went on to

positions in non-STEM disciplines. The remaining students have not yet received the degree that they were pursuing while the received their Space Grant award.
**Note: These numbers will be revised when reporting our base + augmentation funds.*

- **Minority-Serving Institutions**: ASGC supported 2 MSI's in FY11, which are both HBCU's (AAMU and TU). The total number of **directly funded/significantly supported** student awards to MSI's was 28 (17 Fellowship/Scholarship and 11 Higher Education/Research Infrastructure) out of 76 total directly funded/significantly supported student awards (37%). ASGC supported 97 (36%) underrepresented minority students out of 270 students in our Fellowship/Scholarship, Higher Ed and Research programs across the state.

- **NASA Education Priorities - Current Areas of Emphasis**:
    - **Community Colleges**: ASGC added a new Community College partner in FY11, Shelton State Community College (SSCC) in addition to the other CC partner we secured the year before, Bevill State Community College (BSCC). ASGC created a new program at SSCC that includes students working with the University of Alabama (UA) on projects such as Lunabotics and University Student Launch Initiative and a moonbuggy program at BSCC. This year ASGC was able to participate in SSCC's "Engineering Day" on 4/19/12 in Tuscaloosa, Alabama. Interested students from Shelton and area high schools were invited to participate in the day's activities. Four SSCC students presented their ASGC-sponsored research, which was conducted over the past year at UA to foster a "Bridge Program" to measurably increase the participation between community college students and universities. We are currently working to start up a BalloonSat or Robotics program at Snead State Community College in Boaz, Alabama.
    - **Engagement with Middle School Students and Educators**
      We are continuing our work with the UAH Institute for Science Education and the Alabama Mathematics, Science, Technology and Engineering Coalition for Education to provide new BalloonSat opportunities for Middle School Students and K-12 educators. Middle school students will be provided with an exciting introduction into the engineering process in the aerospace world of 'design, build, fly and evaluate.' The classroom curriculum will track the BalloonSat experience and the intention is to use this project as a pilot for a feeder-system into the established Alabama Engineering Academy Initiative in area high schools. This opportunity will target schools having high minority participation and they hope to see increased SAT scores in physical science.

## IMPROVEMENTS MADE IN THE PAST YEAR

- Engagement with State of Alabama STEM Education Initiatives
  ASGC has worked with many Alabama stakeholders to push the development of STEM education within the state. UAH received approval from The University of Alabama Board of Trustees to offer a Master of Science in Integrated Science,

Technology, Engineering and Mathematics (MS-ISTEM) program. The new degree received approval by the Alabama Commission of Higher Education and was created to advance STEM expertise of in-service secondary school science and mathematics educators. The MS-ISTEM graduate program is a direct result of science education reform begun under the Alabama Mathematics, Science and Technology Initiative (AMSTI). This followed the national model for science instruction by creating the Hands-On Activity Science Program (HASP). The ASGC Director, Dr. John Gregory, was a member of the founding committee of AMSTEC. The program's success was phenomenal and other states have developed similar models. AMSTI has become one of the largest most comprehensive and successful initiatives in the nation. More than 350,000 students in Alabama receive instruction by AMSTI certified teachers twice a day in mathematics and science. AMSTEC is an affiliate member of the ASGC and continues its efforts for systematic change of STEM education.

- Increased Engagement with Community Colleges

  ASGC added a new Community College partner in FY11, Shelton State Community College (SSCC). ASGC was able to participate in SSCC's "Engineering Day" on 4/19/12 in Tuscaloosa, AL. Interested students from Shelton and area high schools were invited to participate in the day's activities. Dr. John Baker, ASGC Campus Director from the University of Alabama (UA), was the keynote speaker. The ASGC-sponsored UA's Lunabotics team was able to demonstrate their robots in the atrium for the students and UA's Society of Women in engineering shared information about various engineering disciplines. Four SSCC students presented their ASGC-sponsored research, which was conducted over the past year at UA to foster a "Bridge Program" to measurably increase the participation between community college students and universities. The SSCC Physics department had interactive demonstrations and several area businesses and industries were on hand to discuss engineering career opportunities. The day culminated with an egg drop competition in the atrium of SSCC. This event was organized by Renea Randle, a female mathematics instructor at SSCC and who works in collaboration with our Campus Director at UA, Dr. John Baker.

- Increased Industrial Partnership Funding

  ASGC sponsored 3 NASA Great Moonbuggy Race competition teams in FY11, Bevill State Community College, Alabama A&M University (HBCU) and The University of Alabama in Huntsville. They all competed on 4/13-4/14/2012 at the U.S. Space and Rocket Center in Huntsville, AL with the NASA Administrator, Charlie Bolden and the Associate Administrator for Education, Leland Melvin in attendance. There were more than 80 student teams from 20 states, and 7 countries in the competition. The ASGC was able to leverage its funds with all 3 of our competition teams by more than 1:1 match from industrial companies such as Alabama Power Company and Lockheed Martin.

- Learning Opportunities for Middle School Students and Educators*

  We are continuing our work with the UAH Institute for Science Education and the Alabama Mathematics, Science, Technology and Engineering Coalition for Education to provide new BalloonSat opportunities for Middle School Students

and K-12 educators. Middle school students will be provided with an exciting introduction into the engineering process in the aerospace world of 'design, build, fly and evaluate.' The classroom curriculum will track the BalloonSat experience and the intention is to use this project as a pilot for a feeder-system into the established Alabama Engineering Academy Initiative in area high schools. This opportunity will target schools having high minority participation and they hope to see increased SAT scores in physical science. **Note: This objective will be addressed further with our augmentation funds.*

- High Priority on Scholarship/Fellowship Recruiting

  ASGC saw a 32% increase in the number of scholarship and fellowship applicants in FY11. This is due to an increased focus on advertising/recruiting. ASGC created fliers and ads to be disseminated at the various campuses throughout the state and all ASGC campus directors were told to post the ads in their student newspapers, attend classes to make announcements, and post the ASGC fliers. As a result, we had 71 scholarship applicants and 39 fellowship applicants and we made 43 total awards from 119 applicants (36% of applicants received awards in FY11).

## PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

The ASGC collaborates with many institutions across the state in the execution of its programs. We have a closely-knit management team consisting of the campus directors of all the 7 Research Universities across the state (2 of which are HBCU's) and a couple of others including the University Affairs Officer at MSFC. We call the home institutions of the Management Council **"Members"** of ASGC and all other partners we call **"Affiliates"**. The affiliates tend to come and go, that is they may not participate each year; they may come in for a special opportunity. The provision of these affiliate resources, while very real and valuable, does not mean that these partners have any inclination to participate in the management of the overall program, and in fact most simply do not have the time to spend finding out about all the other programs in ASGC. **All our "members"** do, however, actively participate in management and are interested in what the other members are doing.

The demographics for the 7 research universities in Alabama, which is in the Southeastern region of the U.S., has changed in the past 20 years. UAB with 16,000 students is 26% minority. UA, AU, and UAH together are about 14% minority, and USA has drastically changed its minority enrollment strategy and is 20% minority. Together the majority enrollment research universities in Alabama have almost twice as many minority students as the 2 major research HBCU universities, AAMU and TU.

Institution of Higher Education (Bachelor's and/or Graduate Degree Granting): 7 (Alabama A&M University, Auburn University, The University of Alabama, The University of Alabama in Huntsville, The University of Alabama at Birmingham, University of South Alabama and Tuskegee University).

- **Alabama A&M University** (AAMU). HBCU, Public, Ph.D. degree-granting research university. Campus Director is Dr. V. Trent Montgomery, Dean, School of

Engineering and Technology. AAMU participates in Scholarships, Fellowships, Student Interns, BalloonSat Program, University Student Launch Initiative, and Moonbuggy Programs.

- **Auburn University** (AU). Public, Ph.D. degree-granting research university. Campus Director is Dr. David G. Beale, Professor, Department of Mechanical Engineering. AU participates in Scholarships, Fellowships, Student Interns, BalloonSat Program, CubeSat Program, Lunar Regolith Competition, and Course Development.

- **The University of Alabama** (UA). Public, Ph.D. degree-granting research university. Campus Director is Dr. John Baker, Professor, Department of Mechanical Engineering. UA participates in Scholarships, Fellowships, Student Interns, BalloonSat Program, Lunar Regolith Competition, Autonomous Vehicle Program, University Student Launch Initiative, and Design-Build-Fly Program.

- **The University of Alabama at Birmingham** (UAB). Public, Ph.D. degree-granting research university. Campus Director is Dr. Yogesh K. Vohra, Professor, Department of Physics. UAB participates in Scholarships, Fellowships, and REU Program.

- **The University of Alabama in Huntsville** (UAH). Public, Ph.D. degree-granting research university. Campus Directors are Drs. Gerald R. Karr and Kader Frendi, Professors, Department of Mechanical and Aerospace Engineering. UAH participates in Scholarships, Fellowships, BalloonSat Program, University Student Launch Initiative, Moonbuggy Program, State/Regional Science and Engineering Fairs, REU Program, Student Interns, CanSat Program, CubeSat Program, Science Olympiad, Sounding Rocket Workshops, Course Development and is working to develop a Middle School Student/Teacher BalloonSat Education Program.

- **University of South Alabama** (USA). Public, Master's degree-granting research university. Campus Director is Dr. John W. Steadman, Dean, College of Engineering. USA participates in Scholarships, Fellowships, University Student Launch Initiative, Math Olympiad, Summer Intern Program, and REU Program.

- **Tuskegee University** (TU). HBCU, Private, Ph.D. degree-granting research university. Campus Director is Dr. Gregory V. Murphy, Department Head, Electrical and Computer Engineering. TU participates in Scholarships, University Student Launch Initiative, and Student Interns.

Institution of Higher Education (Community College/2-Year Institution): 2 (Bevill State Community College and Shelton State Community College).

- **Bevill State Community College** (BSCC). Public, associate degree-granting community college. Campus Director is Ms. Maurice Ingle, Drafting Design Engineering Technology Department. BSCC currently supports 2 Moonbuggy Programs.

- **Shelton State Community College** (SSCC). Public, associate degree-granting community college. Campus Director is Ms. Renea Randle, Mathematics Department. SSCC currently supports 1 Research Bridge Program that focuses on University Student Launch Initiative and Lunar Regolith Competition with the University of Alabama.

Government (Federal/State/Local): 3 (MSFC; Ex-officio member of ASGC Management Team, the Alabama Mathematics, Science, Technology and Engineering Coalition for Education (AMSTEC) and the Von Braun Center for Science and Innovation, Inc. (VCSI).

- **NASA - MSFC**. Federal. We collaborate with all NASA centers to place student interns and faculty fellows, but due to proximity, we closely have ties with MSFC. We partner with them on various projects and programs such as running 2 Advanced Rocketry Workshops that are preparing student teams to participate in the NASA University Student Launch Initiative. We also manage the NASA Academy, the NASA Propulsion Academy and the NASA Robotics Academies during the summer for MSFC. Our contact at MSFC is Dr. Frank Six, University Affairs Officer.

- **Alabama Mathematics, Science, Technology and Engineering Coalition for Education** (AMSTEC). Non-Profit/State. We partner with AMSTEC on various K-12 educator programs, workshops and summits. AMSTEC works closely with the State Department of Education to improve math and science teaching statewide and to make efforts for systematic change of STEM education. Their mission is to provide all students in Grades K-12 with the knowledge and skills needed for success in the workforce and/or postsecondary studies. Our contact person at AMSTEC is Ms. Brenda Terry, Executive Director.

- **Von Braun Center for Science and Innovation** (VCSI). Non-Profit/Local. The mission of VCSI is to provide innovative engineering solutions and science applications for NASA, DoD, and other government agencies. We collaborate with VCSI by placing student interns here. Our contact person at VCSI is Mr. Marty Kress, Executive Director.

Industry: 2 (The Boeing Company and Dynetics, Inc.).

- **The Boeing Company**. We work with Boeing to provide student internship opportunities and they are one of the major supports of the Alabama Science and Engineering Fair. Our contact person at Boeing is Ms. Tina Watts, Community and Education Relations Specialist.

- **Dynetics, Inc.** Dynetics provides us with many guest speakers to our various Awards Banquets and Workshops. We also partner with Dynetics by providing students and faculty to participate on the "Rocket City Space Pioneers" program. The Rocket City Space Pioneers, made up of Huntsville partners Dynetics (team leader), Teledyne Brown Engineering, Andrews Space, Spaceflight Services, Draper Laboratory, the University of Alabama Huntsville, and the Von Braun Center for Science & Innovation, will compete for the Google Lunar X PRIZE. Our contact person at

Dynetics is Mr. Tim Pickens, Chief Propulsion Engineer and Commercial Space Advisor.

Museum/Science Center/Planetarium: 1 (U.S. Space and Rocket Center).

- **U.S. Space and Rocket Center** (USSRC). We partner with the USSRC on various K-12 teacher training and informal education projects. Our contact person at USSRC is Ms. Mare Gilmore, Director of Education for Space Camp.